

AROBCAD Status:

- **Things that are working well**
- **Top Three Needed Improvements**
- **Steps to Improve Task Performance**
- **Proposed Task Deviations**

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Things that are working well

- “Guidance” Documentation (not user manuals) has been initiated for AROBCAD (TSUNAMI & SMORES) products
- SCALE is about to be released with all AROBCAD software except GLLSM (to be released mid- to late-summer – 2004)
- EM Work is progressing but training for SRS(WSMS), Hanford, and Idaho will necessarily be delayed until mid- to late-summer in order to complete site-problem analyses and to include GLLSM training
- We are building a “Sensitivity Data File” (about 500 experiments to date) for incorporation with a future revision to SCALE
- Code development/debugging has been progressing at a rapidly increasing rate due to TSUNAMI evaluations for problems of
 - DOE EM waste tank, Pu/Gd liquid waste, waste drums, spent fuels storage/transport
 - NRC spent fuel shipping casks, MOX facility analysis, and
 - OECD MOX Experimental Needs analyses
- Interfacing with NDAG
- Usefulness to the Nuclear Data element of DOE NCSP
- 5 Subtasks have been addressed

Made & Missed Commitments of 2003

- **Implementation of optimization techniques for establishing bounding values –**
 - **SMORES and User Manual was ready for SCALE 5 release last November 2003**
 - **SMORES training materials not completed**
 - **Application of SMORES to minimum critical parameters for DOE and ANS problems addressed**
 - **Participated in OECD Expert Group on Minimum Critical Values**

Made & Missed Commitments of 2003 (cont.)

- Investigation of the means to resolve or incorporate anomaly and discrepancy effects into bounding values
 - Evaluation and reporting on selected experimental S/Us for experiments having exceptionally large computed biases and uncertainties (e.g., IHCSBE U(3)F4 Green Block.) not completed – resources directed at co-supported (DCS, NRC, & DOE) of MOX Fuel Fabrication Facility (MFFF) “anomalies”

Made & Missed Commitments of 2003 (cont.)

- S/U and statistical methods for identifying experimental needs (i.e., critical or near critical and cross-sections) was applied to
 - SRS Pu/Gd
 - Collaboration with IPPE on ISTC#815
 - NRC supported boron cask poison problem
 - DOE and NRC MFFF issues
 - Support of the OECD NEA WPNCs MOX issues
 - Space Nuclear Power NCS for DOE NE/NASA
 - Critical experiment designs for RW
 - Differential cross-section analyses and evaluations (i.e., ENDF developments spin-offs)

Made & Missed Commitments of 2003 (cont.)

- Development and publication of guidance and provision of education/training for interpolating and extrapolating bounding values
 - Issuance of S/U methods and analysis tools in SCALE-5 (e.g., SEN1, SEN3, CANDE/TSUNAMI and TSUNAMI-IP) delay – to be issued in April? 2004
 - Training materials for S/U methods have been developed
 - In-field user assistance/training in the application of S/U methods limited to NRC and INEEL staff development training
 - SCALE GLLSM module has been completed and has had very limited release for testing

Made & Missed Commitments of 2003 (cont.)

- **Development and publication of guidance and provision of education/training for establishing bounding margins of subcriticality**
- **Technical reports summarizing current approaches to characterizing acceptable margins of subcriticality have been and are being issued**

Some evidence of completed commitments

- Sedat Goluoglu, C. M. Hopper, and B. T. Rearden, "Extended Interpretation of Sensitivity Data for Benchmark Areas of Applicability," *Trans. Am. Nucl. Soc.*, 88, 77 (2003)
- B. L. Broadhead, B. T. Rearden, C. M. Hopper, J. J. Wagschal, and C. V. Parks, "Sensitivity- and Uncertainty-Based Criticality Safety Validation Techniques," *Nuclear Science and Engineering* : 146, 1–27, Accepted June 20, 2003
- B. T. Rearden, "Perturbation Theory Eigenvalue Sensitivity Analysis with Monte Carlo Techniques," *Nuclear Science and Engineering* (Accepted for Publication)
- Sedat Goluoglu, C. M. Hopper, "Assessment of Areas of Applicability of Benchmarks for Gadolinium Using KENO V.a and the 238-Group SCALE Cross-Section Library," ORNL/TM-2003/106, June 2003
- B. T. Rearden, W. J. Anderson, G. A. Harms, and J. S. Tulenko, "Critical Experiments with Intermediate Enriched UO₂ Fuel," Submitted to ICNC 2003
- Y. Karni, D. Regev, E. Greenspan, S. Goluoglu, L. Petrie and C. Hopper, "The SMORES Capability for Minimum Critical Mass Determination," ICNC2003, October 20-24, 2003, Tokaimura, Japan
- S. Goluoglu, K. R. Elam, B. T. Rearden, B. L. Broadhead, and C. M. Hopper, "Sensitivity Analysis Applied to the Validation of the ¹⁰B Capture Reaction in Nuclear Fuel Casks," ORNL/TM-2004/48, drafted Oct 2003
- P. B. Fox, L. M. Petrie, draft of "Minimum Critical Masses" produced for the OECD NEA WPNCs Minimum Critical Mass Expert Group – to be published 2004
- B. T. Rearden, C. M. Hopper, K. R. Elam, S. Goluoglu, and C. V. Parks, "Applications of the TSUNAMI Sensitivity and Uncertainty Analysis Methodology," ICNC2003
- K. R. Elam and B. T. Rearden, "Use of Sensitivity and Uncertainty Analysis to Select Benchmark Experiments for the Validation of Computer Codes and Data," *Nucl Sci & Eng* 145, 196-212 (2003)
- W. J. Anderson, M. Saglam, B. T. Rearden, and R. Smith, "Reactor Physics and Criticality Benchmark Evaluations for Advanced Nuclear Fuel: Experiment Analysis Comparison Report," *Proc. Of Am Nucl Soc, Advances in Nucl Soc, Advances in Nuclear Fuel Management III*, Oct 2003

Top Three Needed Improvements and Steps to Address Improvements

- **Continuity of fiscal support – to be resolved with FY2005 schedule**
- **Commitment of staff to deliverables – likely to be resolved with FY2005 schedule**
- **Providing staff aligned with tasks for completing**
 - **Users Manuals**
 - **Training Materials & Courses**
 - **User Implementation Guidance**
 - **Completion of Software & Transition to Methods Maintenance**

**Likely to be resolved with FY2005 schedule
(continuing resolutions?)**

Proposed Task

- **Deviations**

- None without CSSG redirection (see November 2003 United States Department of Energy Nuclear Criticality Safety Program Five-Year Plan)

- **Extensions**

- The S/U methodology needs to be extended for KENO-VI geometry capabilities (~1_ man years to completion)
- The adaptation of GRESS to FORTRAN-90 for the differentiation of the CENTRM cross processing code for use in TSUNAMI

**Evidence of past performance
demonstrates we can/do deliver when
provided the resources to do the job – we
look forward to greater efficiency of
performance with the plan for
stable/continuous support**

- We expect our productivity to increase as the result of:
 - Little to no disruption of task support
 - Reduced need to solicit alternative customers to maintain staff availability
 - Little to no competition for AROBCAD personnel & time resources

Duh!

(nothing new to anybody)

We will do what we can – with what we have – when we can